	Application No.	Applicant(s)
Notice of Allowability	09/821,428	CHEN ET AL.
	Examiner	Art Unit	
	Dmitry Levitan	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *4/04/06*.

2. ☒ The allowed claim(s) is/are *1-4, 6-15 and 18-20 renumbered as 1-17*.

3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☒ All   b) ☐ Some*   c) ☐ None   of the:
   1. ☒ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of
      Paper No./Mail Date _____ .
   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)
1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____ .

Amendment, filed 04/04/06, has been entered.

Drawings

The drawings were received on 4/04/06. These drawings are approved.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be

unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure

consideration of such an amendment, it MUST be submitted no later than the payment of the

issue fee.

Authorization for this examiner's amendment was given in a telephone interview with

Jiawei Huang on 4/18/06.

The application has been amended as follows:

Claims 1-4, 6-15 and 18-20 have been amended per Attachment A.

Note. Claims 6, 11 and 18 were amended for clarity.
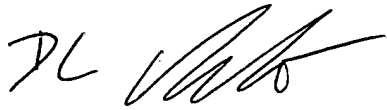
Allowable Subject Matter

Claims 1-4, 6-15 and 18-20 are allowed.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Dmitry Levitan whose telephone number is (571) 272-3093. The

examiner can normally be reached on 8:30 to 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Doris To can be reached on (571) 272-7529. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dmitry Levitan
Examiner
Art Unit 2616

Attachment A

Claim 1. (Previously Presented) A switch controller inside a switch device capable of easing network congestion, the switch controller has a plurality of ports and the switch device further includes a shared buffer and a plurality of physical layer devices (PHY), the shared buffer can be divided into a plurality of buffering units, the switch controller comprising:

a buffer control device coupled to the shared buffer for assigning and releasing the buffering units;

a plurality of port control devices coupled to the physical layer devices and the buffer control device, wherein each port control device has a one-to-one correspondence with the ports, the port control device that corresponds to a source port receives a network packet and then sends the packet to at least one of the buffering unit(s) for storage;

a forwarding control device coupled to the port control devices, and a target port of the packet is determined according to a header of the network packet; and

a queue control device coupled to the port control devices and the buffer control device, wherein the queue control device further includes a plurality of output queues, each output queue has a one-to-one correspondence with the port control devices, and the buffering unit for storing the packets is linked to the output queue corresponding to the port control device at a target port;

wherein each output port has a number of reserved buffering units which are not used by any other output port, and the source port triggers or terminates a congestion mode to control the

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number of free buffering units in response to the number of reserved buffering units in the output

queue, and each port control device includes:

a receive medium access control device coupled to one of the physical layer devices,

wherein the received medium access control device inspects any incoming network packet for

errors, if no errors is found, the packet is accepted, otherwise the packet is returned;

a receive control device coupled to the receive medium access control device, the queue

control device and the buffer control device, the receive control device issues requests to the

buffer control device to assign at least one buffering units(s) for storing the packet and signals the

queue control device to request queuing to the corresponding output queue;

an output control device, coupled to the queue control device and the buffer control

device for outputting the packet from the output queue, and releasing the buffering units after the

buffer control unit has sent out the packet;

a transmission medium access control device coupled to the output control device and

one of the physical layer devices for outputting the packet to the physical layer device, and when

the congestion control mode is triggered, the transmission medium access control device within

the port control device that corresponds to the source port sends out a control signal to execute

the congestion control operation; and

a physical layer control device coupled to the transmission medium access control device

and one of the physical layer devices, receiving a plurality of state signals from an external

network device to select a proper congestion control mode.

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Claim 2. (Previously Presented) The switch controller of claim 1, wherein a kth port is the

target port and a plurality of parameters are defined as follows:

$Q[k]$: length of the output queue of the kth port;

R_{max} : number of maximum buffering units reserved for each port;

$R[k]$: number of buffering units reserved for the kth port,

$R[k] = 0$ when $R_{max} <= Q[k]$; and

$R[k] = R_{max} - Q[k]$ when $R_{max} > Q[k]$.

Ψ : the total number of reserved buffering units, i.e., $\Psi = \sum_{k=0}^{n} R[k]$;

Φ : number of free buffering units;

C : the number of reserved buffering units in a virtual free space;

Ω : number of virtual free buffers,

when $\Phi <= C$, $\Omega = 0$, and when $\Phi > C$, $\Omega = \Phi - C$;

W : minimum number of reserved virtual buffering unit;

wherein the congestion control mode is triggered when $\Omega <= max \{\Psi, W\}$ and

$R[k] = 0$.

Claim 3. (Original) The switch controller of claim 2, wherein the number of reserved

buffering unit in virtual free space C is 10, and the lowest number of reserved buffering units in

virtual free space W is 28.

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Claim 4. (Original) The switch controller of claim 1, wherein a kth port is the target port

and a plurality of parameters are defined as follows:

Q[k] : the output queue length of the kth port;

R_{max} : the greatest number of buffering units reserved by the port;

R[k] : the number of buffering units reserved by the kth port,

when $R_{max} <= Q[k]$, R[k] = 0, and

when $R_{max} > Q[k]$, R[k] = $R_{max} - Q[k]$;

wherein the congestion control mode for the k_{th} port is triggered when any of the other

ports has already triggered a congestion control mode and R[k] = 0.

Claim 5. (Cancelled)

Claim 6. (Currently Amended) The switch controller of claim 1, wherein the controller

further includes a CPU port capable of connecting with a CPU for a two-way data transmission

via an ~~ISA/IDE~~ IDE (Integrated Drive Electronics) interface based on an ISA (Industry Standard

Architecture) bus standard.

Claim 7. (Previously Presented) The switch controller of claim 1, wherein the congestion

control mode includes a backpressure control mode, a drop control mode and a flow control

mode.

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Claim 8. (Original) The switch controller of claim 7, wherein the backpressure control mode is selected when the external network device operates in a half-duplex mode without flow control capability.

Claim 9. (Original) The switch controller of claim 7, wherein the drop control mode is selected when the external network device operates in a full-duplex mode but without flow control capability.

Claim 10. (Original) The switch controller of claim 7, wherein the flow control mode is selected when the external network device operates in a full-duplex mode with flow control capability.

Claim 11. (Currently Amended) A method for easing data transmission congestion in a switch device having a plurality of ports, the switch device includes a shared buffer capable of <u>being divided</u> ~~dividing~~ into a plurality of buffering units, comprising the steps of:

providing a plurality of output queues, wherein the output queues have a one-to-one correspondence with the ports;

assigning the buffering units in the shared buffer;

receiving a packet from a source port and storing the packet in an assigned buffering unit;

determining ~~the~~ <u>a</u> target port of a network packet according to a header of the packet;

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linking buffering unit containing the stored network packet to the output queue that corresponds to the target port;

outputting the network packet from the target port;

releasing the buffering unit after the network packet is output;

selecting a ~~type~~ <u>mode</u> of congestion control in response to an external network device; and

controlling free buffering units according to a number of reserved buffering units in the output queue and a triggering or a terminating condition of the source port;

wherein each output port has a number of reserved buffering units which are not used by any other output port, and the congestion control mode includes a backpressure control mode, a drop control mode and a flow control mode.

Claim 12. (Previously Presented) The method of claim 11, wherein a kth port is the target port and a plurality of parameters are defined as follows:

$Q[k]$: length of the output queue of the kth port;

R_{max} : number of maximum buffering units reserved for each port;

$R[k]$: number of buffering units reserved for the kth port,

$R[k] = 0$ when $R_{max} <= Q[k]$; and

$R[k] = R_{max} - Q[k]$ when $R_{max} > Q[k]$

Ψ : the total number of reserved buffering units, i.e., $\Psi = \sum_{k=0}^{n} R[k]$;

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Φ : number of free buffering units;

C : number of reserved buffering units in a virtual free space;

Ω : number of virtual free buffers,

when $\Phi <= C$, $\Omega = 0$, and when $\Phi > C$, $\Omega = \Phi - C$;

W : minimum number of reserved virtual buffering unit;

wherein a congestion control mode is triggered when $\Omega <= \max \{\Psi, W\}$ and R[k]

= 0.

Claim 13. (Original) The method of claim 12, wherein the number of reserved buffering

unit in virtual free space C is 10, and the minimum number of reserved buffering units in virtual

free space W is 28.

Claim 14. (Original) The method of claim 11, wherein a kth port is the target port and a

plurality of parameters are defined as follows:

Q[k] : length of the output queue of the kth port;

R_{max} : number of maximum buffering units reserved by the port;

R[k] : number of buffering units reserved by the kth port,

R[k] = 0 when $R_{max} <= Q[k]$; and

$R[k] = R_{max} - Q[k]$ when $R_{max} > Q[k]$;

wherein a congestion control mode is triggered when any one of the port has already

triggered a congestion control mode and R[k] = 0.

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Claim 15. (Previously Presented) The method of claim 11, wherein a plurality of parameters are defined as follows:

Φ : the number of free (unassigned) buffering units;

C : the number of reserved buffering units in a virtual free space;

Ω : the number of virtual free buffers,

when $\Phi <= C$, $\Omega = 0$, and when $\Phi > C$, $\Omega = \Phi - C$;

when $\Phi = 0$, the congestion control mode is triggered.

Claim 16-17 (Cancelled)

Claim 18. (Currently Amended) The method of claim 11, wherein the backpressure control mode is selected when the external network device operates in a half-duplex mode without flow control capability.

Claim 19. (Previously Presented) The method of claim 11, wherein the drop control mode is selected when the external network device operates in a full-duplex mode but without flow control capability.

Claim 20. (Previously Presented) The method of claim 11, wherein the flow control mode is selected when the external network device operates in a full-duplex mode with flow control capability.